

## TWO NEW SPECIES, NOMENCLATURAL CHANGES, AND RANGE EXTENSIONS IN MEXICAN *ARCEUTHOBIMUM* (VISCACEAE)

Frank G. Hawksworth

USDA Forest Service, Rocky Mountain Forest and Range  
Experiment Station, Fort Collins, Colorado 80526  
and

Delbert Wiens

Department of Biology, University of Utah  
Salt Lake City, Utah 84112

### ABSTRACT

Two new species of *Arceuthobium* are described as parasites of pines (*Pinus*) in México: *A. yecorensense* infects several species of pines (*Pinus*) in eastern Sonora, western Chihuahua, and western Durango; *A. oaxacacum* is known only from two populations in one locality in southern Oaxaca. *Arceuthobium vaginatum* subsp. *durangense* Hawksw. & Wiens is raised to specific status. This taxon was previously known only in Durango and Sinaloa and is reported here for the first time in Jalisco. *Arceuthobium gillii* subsp. *nigrum* Hawksw. & Wiens, also raised to specific status, is widespread in México from Durango to Chiapas on many species of pines. *Arceuthobium abietinum* Engelm. ex Munz, a common parasite of true firs in the western United States, was found north of Temosachic, Chihuahua, on *Abies durangensis* - the first report of it from México. With these additions, 22 taxa of *Arceuthobium* are known from México.

KEY WORDS: *Arceuthobium*, Viscaceae, parasitic plants, forestry, México.

As part of our continuing investigations of the genus *Arceuthobium* in México (Hawksworth & Wiens 1965, 1970, 1972, 1977, 1980, 1984), we describe two new taxa, make two new nomenclatural combinations, and record the occurrence in México of a species previously known only in the United States. With these additions and changes, 22 taxa (19 species and 3 subspecies) are now known from México. This is nearly half the total number of taxa known for *Arceuthobium* worldwide.



The methods we use in our taxonomic studies of dwarf mistletoes are detailed in Hawksworth & Wiens (1972). (Where a range is given for a character, the number in parentheses is the mean).

**Arceuthobium yecorense** Hawksworth & Wiens, sp. nov. TYPE: MÉXICO.

Sonora: Mun. Yecora: 2 km ESE of Yecora, on *Pinus herrerae*, Lat. 28°22' N, Long. 108°54' W, elevation 1600 m, Hawksworth 2168, 7 May 1987.

HOLOTYPE: US; Isotypes: ENCB, FPF, INIF, MO, MEXU, UC.

Plantae 8-17 (12) cm altae; surculi brunneo-virides ad flavo-virides, parce flabellatum ramosi; surculi principales basi 2-5 (3) mm diam, internodio tertio 10-21 (15) mm longo, 2-4 (2.5) mm lato; flores ignoti, anthesis probabilis mense Junio; fructificatio ignoti; plantae in pino parasiticae.

This mistletoe was first collected in 1986 near Yecora, Sonora, by Biol. Ignacio Carbajal V. of Forestal Sanidad, SARH, México City. Later, the senior author found that the dwarf mistletoe was a common parasite of pines south and east of Yecora. Its principal hosts there are *Pinus leiophylla* Schiede & Deppe var. *chihuahuana* (Engelm.) Shaw and *P. herrerae* Martínez. It occurs less commonly on *P. engelmannii* Carr., but does not parasitize associated *P. arizonica* Engelm. The mistletoe was also found a few kilometers into Chihuahua west of Yepachic. In November 1987, the senior author visited the pine forests about 100 km southwest of Santiago Papasquiaro, Durango, where *Arceuthobium yecorense* occurs on *Pinus herrerae*, *P. lumholtzii* Robinson & Fernald, *P. leiophylla* var. *chihuahuana*, *P. engelmannii*, and *P. durangensis* Martínez. As these two known populations are more than 400 km apart, the species probably occurs in intervening forest areas in western Chihuahua and northwestern Durango.

*Arceuthobium yecorense* is characterized by its slender, greenish-yellow to brownish shoots and early summer flowering period. The actual time of anthesis has not been observed, but judging by the state of development of the flowers in early May we suspect that it flowers in June. This species is a member of the subgenus *Vaginatium*, section *Vaginata*. It is morphologically most similar to *A. aureum* subsp. *aureum* of the lowlands of Guatemala and Belize (Hawksworth & Wiens 1977). The *A. yecorense* population in western Durango has more yellowish and slightly taller shoots than the Sonora population, but otherwise they are similar. The specific name is derived from the pueblo of Yecora, the primary pine-producing area of Sonora, where the taxon is common and damaging.

Specimens examined: MÉXICO. Chihuahua: 4 km E of Sonora boundary on Yecora-Maiocova road, on *P. leiophylla* var. *chihuahuana*, Hawksworth 2178 in 1987. Durango: Mun. Otaez: Ojito del Caiman, 49 km SW of Altares on road to Banome, on *Pinus herrerae*, Hawksworth et al. 2249 in 1987; same locality on *P. durangensis*, Hawksworth et al. 2250 in 1987; 63 km SW of Altares on road to Banome, on *P. lumholtzii*, Hawksworth et al. 2252 in 1987. Sonora: Mun. Yecora: Predio Ejidal Mesa el Indio, on *P. herrerae*, I. Carbajal



V. in 1986 (FPF); 6 km W of Chihuahua boundary on Yecora-Maiocova road, on *P. leiophylla* var. *chihuahuana*, Hawksworth 2177 in 1987; Cañada Cabeza de Vaca, 9 km SE of Yecora, on *P. herrerae*, Hawksworth 2170 in 1987; same locality, on *P. engelmannii*, Hawksworth 2171 in 1987.

***Arceuthobium oaxacanum*** Hawksworth & Wiens, sp. nov. TYPE: MÉXICO. Oaxaca: Mun. Tamazulapán: 13 km south of Miahuatlán (and 0.5 km south on dirt side road) off Puerto Angel road (Rte 175), parasite of *Pinus lawsonii*, Lat. 16°10' N, Long. 96°32' W, elevation 2200 m, D. Wiens & C.L. Calvin 6003, 20 August 1985. HOLOTYPE: US; Isotypes: ENCB, FPF, INIF, MO, MEXU.

Plantae 8-20 (12) cm altae; surculi brunneo-rufi, parce flabellatum ramosi, surculi principales basi 2-4 (3) mm diam, internodio tertio 10-17 (12) mm longo, 2-3 mm lato; fructus maturus 3.5 mm longo, 2.3 mm lato; anthesis mense Julio; fructus maturitas mense Augusto; plantae in pino parasiticae.

*Arceuthobium oaxacanum* was first discovered by Dr. R.S. Peterson in 1972 (Hawksworth & Wiens 1977). We originally classed it as an extreme disjunct (of about 1200 km) of *A. rubrum* Hawksw. & Wiens but noted that the Oaxacan plants were somewhat larger than those from the Sierra Madre Occidental in Durango (Hawksworth & Wiens 1977). We have subsequently studied both taxa in the field and conclude that they are distinct species. Some comparative characters of *A. oaxacanum* and *A. rubrum* are given in Table 1. In general, *A. oaxacanum* is a larger, lighter colored, more openly branched plant than *A. rubrum*, and it causes larger witches' brooms. *Arceuthobium oaxacanum* parasitizes principally *Pinus lawsonii* Roetzl, *P. michoacana* Martínez, and *P. pseudostrobus* Lindl., and occasionally *P. oaxacana* (Martínez) Mirov; none of which occur in the areas where *A. rubrum* has been found. These two taxa and *A. bicarinatum* Urban of Hispanola are unique in the genus in having reddish shoots.

Specimens examined: MÉXICO. Oaxaca: 13 km S of Miahuatlán near Puerto Angel road (Rte 175), on *P. pseudostrobus*, Peterson 72-111 in 1972 (FPF); on *P. lawsonii*, Hawksworth, Wiens & Player 1557 in 1975 (FPF); on *P. michoacana*, Hawksworth, Wiens & Player 1561 in 1975 (FPF); and on *P. lawsonii*, Wiens 5981 in 1984 (FPF); 7 km S of Rte 175 on dirt road leaving highway 6 km S of Miahuatlán, Lat. 16°11' N, Long. 96°34' W, on *P. lawsonii*?, Nickrent & Keller 2035 in 1985 (ILL).

***Arceuthobium durangense*** (Hawksworth & Wiens) comb. nov. Basionym: *A. vaginatum* (Willd.) Presl subsp. *durangense* Hawksworth & Wiens, Brittonia 17:230. 1965. Lectotype: MÉXICO. Durango: 59 km west of El Salto on Rte 40, on *Pinus durangensis*, Hawksworth & Wiens 3507, July 1963.

This dwarf mistletoe is characterized by dark orange shoots 25 to 40 cm, and sometimes up to 50 cm, tall. It parasitizes several species of pines, including *Pinus douglasiana* Martínez, *P. durangensis* Martínez, *P. herrerae*, *P.*



Character	<i>Arceuthobium oazacatum</i> (5 collections)	<i>Arceuthobium rubrum</i> (17 collections)
Shoot size	8-20 (mean 12) cm tall; basal diameter of shoots 2-4 (3) mm; third inter- node 10-17 (12) by 2-3 mm; pistillate spikes ca 3 mm long	8-18 (mean 10) cm tall; basal diameter of shoots 2-3 mm; third internode 4-12 (7) by 2-3 mm; pistillate spikes 1-1.5 cm long
Shoot habit	Branching of spikes nearly at right angles to main axis of shoot; shoot clusters open	Branching of spikes usually ca 45 degrees to main axis of shoot clusters dense
Shoot color	Pale brownish to reddish	Dark red to blackish
Witches' brooms	Typically with systemic infections; mistletoe shoots scattered for 3-10 dm along the host branch	Typically with non- systemic infections; mistletoe shoots in small clusters
Distribution	Oaxaca	Durango, Sinaloa
Hosts	<i>Pinus lawsonii</i> <i>Pinus michoacana</i> <i>Pinus oazacana</i> <i>Pinus pseudostrobus</i>	<i>Pinus cooperi</i> <i>Pinus durangensis</i> <i>Pinus engelmannii</i> <i>Pinus herrerae</i> <i>Pinus teocote</i>

Table 1: Comparison of some characteristics of *Arceuthobium oazacatum* and *A. rubrum*.

*michoacana*, *P. oocarpa* Schiede, and *P. pseudostrobus*, along the Pacific escarpment of the Sierra Madre Occidental in México at elevations from 1500 to 3000 m. This species was previously known only from Sinaloa and Durango, but here we report it for the first time from Jalisco (Sierra de Quila). It may also occur in Nayarit. We originally treated this mistletoe as a subspecies of *A. vaginatum* because of its general morphological similarity to that species (Hawksworth & Wiens 1965). However, our subsequent studies of several populations of *A. durangense* and *A. vaginatum* subsp. *vaginatum* in the field indicate that they are distinct species. *Arceuthobium durangense* differs from *A. vaginatum* subsp. *vaginatum* in its dark orange (vs. black) shoots, smaller male flowers, later flowering period, and weaker formation of witches' brooms. These two taxa are apparently not sympatric. Also, *A. durangense* is not sympatric with *A. vaginatum* subsp. *cryptopodium*, the southern limits of which are about 300 km north in Chihuahua. See Hawksworth & Wiens (1972) for additional characteristics of these three taxa.

Specimens examined: MÉXICO. Durango: 59 km W of El Salto on Rte



40, on *P. durangensis*, Hawksworth & Wiens 353 in 1963 (COLO, FPF); 72 km W of El Salto on Rte 40, on *P. michoacana*, Hawksworth & Wiens 354 in 1963 (COLO, FPF) and 1237 in 1969 (FPF); 62 km W of El Salto on Rte 40, on *P. durangensis*, Hawksworth 1422 in 1972 (FPF); 1.6 km W of El Madroño on Rte 40, on *P. michoacana*, Nickrent 2049 in 1985 (FPF, ILL). Sinaloa: 16 km W of Durango boundary on Rte 40, on *P. michoacana*, Mathiasen 8120 in 1981 (FPF); 2 km NE of Tropic of Cancer on Rte 40, on *Pinus douglasiana*, Worthington et al. 9391 in 1983 (FPF, UTEP); 75 km E of Rte 15 on Rte 40, on *P. michoacana*, Hawksworth & Wiens 1234 in 1969 (FPF); 11 km E of Cosala, on *P. michoacana*, Mathiasen 8131 in 1981 (FPF). Jalisco: Sierra de Quila, on *P. michoacana*, Hawksworth 2119 in 1986 (FPF) and on *P. pseudostrobus*, Hawksworth 2220 in 1986 (FPF).

***Arceuthobium nigrum*** (Hawksworth & Wiens) comb. nov. Basionym: *A. gillii* Hawksworth & Wiens subsp. *nigrum* Hawksworth & Wiens. *Brittonia* 17:223. 1965. Lectotype: MÉXICO. Durango: 51 km E of El Salto on Rte 40, on *Pinus teocote*, Hawksworth & Wiens 3404, March 1963.

This dwarf mistletoe is a widespread parasite of pines in México. It is known from Durango, Zacatecas, Guanajuato, Queretaro, Hidalgo, México, Tlaxcala, Puebla, Veracruz, Oaxaca, Chiapas, and possibly in western Guatemala (Hawksworth & Wiens 1977). This mistletoe is common on *Pinus herrerae*, *P. lawsonii*, *P. leiophylla* vars. *leiophylla* and *chiuahuana*, *P. lumholtzii*, *P. montezumae* Lamb., *P. oaxacana*, *P. patula* Schiede & Deppe, and *P. teocote* Schiede & Deppe, but rare on *P. cooperi* C.E. Blanco. The taxon is similar to *A. gillii* of Chihuahua, northern Durango, southeastern Arizona and southwestern New Mexico in its glaucous fruits, strong sexual dimorphism of branching (very open and divaricate in staminate plants vs. densely branched in pistillate plants), and parasitism of the three members of the *Pinus leiophylla* group. However, the two taxa differ in so many other characters that they are best treated as distinct species. *Arceuthobium nigrum* differs from *A. gillii* in having taller (15-25 [mean 45] cm vs. 10-15 [mean 25] cm) and darker (dark-green to black vs. greenish brown) shoots. Also, an important, recently discovered, difference is that *A. nigrum* has two flowering periods (March-April and September-October) while *A. gillii* has only one (March-April). To our knowledge, these two taxa are not sympatric, but they occur in the same mountain ranges near Tepehuanes in northern Durango. Even there, however, they are separated both elevationally and by hosts: *A. gillii* is at lower elevations (< 2200 m) on *Pinus leiophylla* var. *chiuahuana* and *P. lumholtzii*, while *A. nigrum* occurs at higher elevations (> 2600 m) on *P. teocote* and *P. leiophylla* var. *leiophylla*.

For distributional information on this species, see Hawksworth & Wiens (1972, 1977, 1984) under *A. gillii* subsp. *nigrum*.



*Arceuthobium abietinum* Engelm. ex Munz.

This species is common on several species of *Abies* in the western United States (Hawksworth & Wiens 1972). It is rare in Arizona on *Abies concolor* (Gord. & Glend.) Lindl., where it is known from only four scattered localities, one of which is in the Chiricahua Mountains in Cochise County, about 60 km north of the Mexican border (Mathiasen 1976). A Mexican population was discovered on *Abies durangensis* Martínez in Chihuahua in 1986 by Ing. Juan Antonio Olivo M. of the Mexican Forest Service. The senior author visited the site near Temosachic in May 1987, and confirmed the identification of the taxon. The taxon is presumably f. sp. *concoloris* (Hawksworth & Wiens 1972) because it is the closest known forma specialis (in Arizona) and also because *Abies durangensis* is closely related to *A. concolor*. The locality is about 450 km south of the mistletoe's previously known southern limits in Arizona. *Arceuthobium abietinum* was locally common in a moist, north-south canyon at about 2400 m on *Abies durangensis*, and rare on *Pinus ayacahuite* Ehrenb. var. *brachyptera* Shaw growing under infected *Abies*. Several other trees in the area (*Pseudotsuga menziesii* (Mirb.) Franco, *Picea chihuahuana* Martínez and *Pinus arizonica*) were not parasitized.

Specimens examined: MÉXICO. Chihuahua: Mun. Temosachic: Rio Chachamuri, 18 km N of Yahuirachi, = 7 km W and 61 km N of Temosachic, on *Abies durangensis*, Hawksworth & J. Olivo M. 2185 in 1987 (FPF) and on *Pinus ayacahuite* var. *brachyptera*, Hawksworth & J. Olivo M. 2186 in 1987 (FPF).

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